ABSTRACT

A new method to form flash memory devices in the manufacture of an integrated circuit device is achieved. The method comprises providing a substrate. A first film is formed comprising a first oxide layer overlying the substrate and a floating gate layer overlying the first oxide layer. A second film is formed comprising a second oxide layer overlying the first film, a control gate layer overlying the second oxide layer, and an insulating layer overlying the control gate layer. The first and second films are patterned to form stacked gates comprising floating gates and control gates. Ions are implanted into the substrate between the stacked gates to form source and drain regions. A third oxide layer is then formed on the sidewalls of the stacked gates. A plug layer is then deposited overlying the substrate and the stacked gates and filling spaces between the stacked gates. The plug layer is etched down to below the top surface of the stacked gates to form conductive plugs contacting the source and drain regions and to complete the flash memory devices.